

# EVA Suit Microbial Leakage

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HAT: 6.1a, 6.1b, 6.2b, 6.2c TA: 06 Human Health, Life Support, and Habitation TRL: start 3 / current 5

## OVERVIEW

NASA has a strategic knowledge gap (B5-3) about what life signatures leak/vent from our Extravehicular Activity (EVA) systems. This will impact how we search for evidence of life on Mars. Characterizing contamination leaks from our suits will help us comply with planetary protection guidelines, and better plan human exploration missions.



Handprint on sterile plate, courtesy  
Tasha Sturm, Cabrillo College.  
<http://www.microbeworld.org/component/option/?id=13867&view=article>

## INNOVATION

A new tool was developed to collect micro-organisms under EVA conditions. JSC designers paired off-the-shelf sterile swabs with a repurposed Space Shuttle tile repair kit tool (16 EVA-certified units available), for an affordable solution.

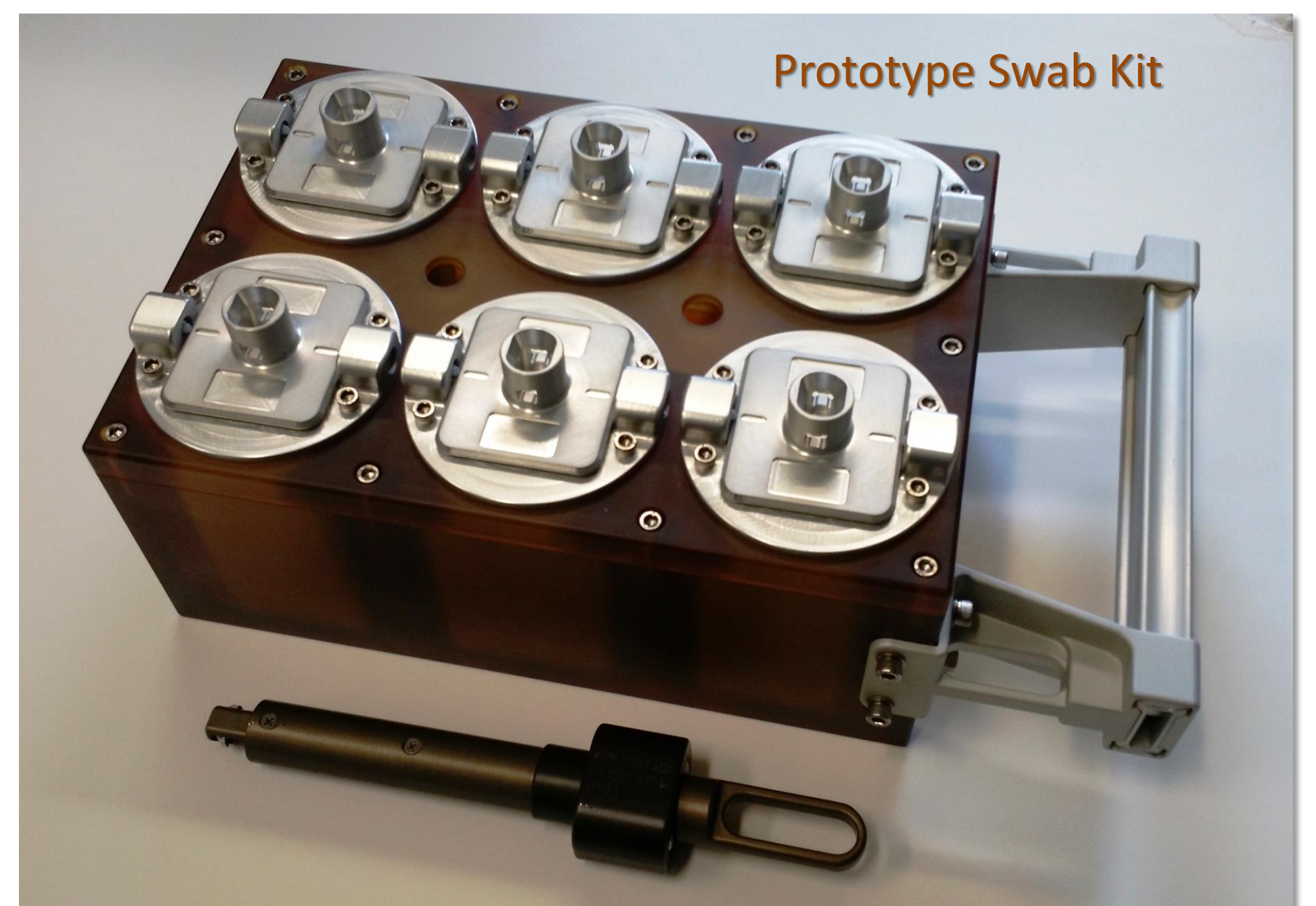


## OUTCOME

- Two EVA Swab Kit prototypes were designed and built
  - Each kit contains 8 sterile sample containers and swab tips
  - Each container uses a microbial filter to accommodate rapid pressure changes without contamination
- Intellectual property disclosures were filed
- Bioload tests indicate that the dry EVA swab is as effective as a standard, wetted laboratory swab
- Identified design improvements during operational tests at NASA Extreme Environment Mission Operations (NEEMO)
- Tested joints on an ISS-style Extravehicular Mobility Unit (EMU) and an experimental Mark III suit

## INFUSION SPACE / EARTH

A flight-certified EVA swab kit can be used to characterize micro-organisms outside the International Space Station (ISS), particularly near life support system vents. Results can be used to develop planetary protection strategies to prevent cross-contamination as we live on, and explore, Mars.



## PARTNERSHIPS / COLLABORATIONS

JSC partnered with microbiologists at JPL, SETI Institute, and the University of Florida on this project.

## PAPERS / PRESENTATIONS

CTSD-ADV-1266, *EVA Swab Tool Form, Fit, and Function Test Report*.

MSC-26092-1, *EVA Swab Tools for Microbial Sample Collection*.

## FUTURE WORK

More suit tests are planned for FY17, including vacuum chamber runs. In addition to ISS life support system vent characterization, we are working with the Center for Advancement of Science in Space (CASIS) to explore commercial partnerships. One company has expressed an interest in using our tool for their ISS research.

